**Trends in Community Pharmacy Counts and Closures Before and After the Implementation of Medicare Part D**

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**Abstract**

**Purpose:** Medicare Part D provided 3.4 million American seniors with prescription drug insurance. It may also have had an unintended effect on pharmacy viability. This study compares trends in the number of pharmacies and rate of pharmacy closures before and after the implementation of Medicare Part D.

**Methods:** This retrospective observational study used data from National Council for Prescription Drug Programs (NCPDP) to track retail pharmacy closures and counts between January 2004 and January 2009. Pharmacies were classified by ownership (chain or independent), location (urban or rural), and whether they were the only pharmacy in a community. Autoregressive Integrated Moving Average (ARIMA) models were used to examine trends in pharmacy counts and closures.

**Findings:** The number of independent and rural pharmacies decreased significantly after the implementation of Medicare Part D. The number of communities that saw their only pharmacy close also increased.

**Conclusions:** Unintended consequences of Medicare Part D may serve to reduce patient access to pharmacy services in opposition to the stated goals of the program.

**Key words** access to care, Medicare, pharmacy, policy, rural
reported that the Medicare prescription drug benefit has
given pharmacy benefit managers (PBMs) leverage to set
low reimbursement rates to pharmacies.\(^5\) Anecdotal and
self-reported evidence shows that low reimbursement
rates have affected the profitability of some pharmacies.\(^6\)
The lower profit margin may put pharmacies at risk for
closure.

Closure of a local pharmacy is cause for concern, espe-
cially in areas where a single pharmacy may be the only
source of medical advice and medication access. Over
half of the independently owned rural pharmacies in the
United States are located at least 10 miles from the next
nearest pharmacy.\(^7\) When the sole pharmacy in a com-
mmunity closes, access to health care will be reduced, and
patients may see negative health consequences due to
an inability to obtain their prescriptions.\(^8\) To date, there
has been little objective research to quantify the effect of
Medicare Part D on access to retail pharmacies.

The primary objective of this study was to examine
trends in the number of retail pharmacies and the rate of
pharmacy closures before and after the implementation
of Medicare Part D. Further, this study sought to deter-
mine if the effect was consistent based on ownership type
(independent or chain) and location (urban or rural).

**Methods**

**Data**

This study was a retrospective analysis of retail pharmacy
availability based on pharmacy billing identifiers. Data
from January 2004 through May 2009 were obtained
via monthly updates from the National Council for Pre-
scription Drug Programs (NCPDP) (www.ncpdp.org). An
NCPDP number is the uniform standard identifier used
by pharmacies to bill third-party payers, so the NCPDP
database is likely to include nearly all retail pharmacies.
This database includes the pharmacy physical location,
NCPDP provider ID, ownership type of the pharmacy (eg,
independent, chain, franchise), and dispenser type of the
pharmacy (eg, retail, long-term care, mail order) for more
than 70,000 pharmacies in the United States.

**Variables**

The dependent variables used in this study were the
monthly counts of retail pharmacies, total and various
subsets, and the monthly number of pharmacy closures,
total and subsets.

Using the categorization of pharmacies by NCPDP, sub-
sets of those pharmacies were created meeting the follow-
ing criteria (in order of use): retail; independently owned
(including franchised pharmacies) or chain (a pharmacy
that is part of a group of 4 or more pharmacies under
common ownership that may or may not share the same
federal tax ID number); located in rural places, defined
as ZIP codes in rural (nonmetropolitan and nonmicrop-
ropolitan) counties or ZIP codes within metropolitan or mi-
cropolitan counties with Rural-Urban Commuting Area
(RUCA) codes of 4.0 or higher; and the only independent
pharmacy, defined as the only pharmacy in the ZIP code.

Pharmacy closures were based on the discontinuation of
NCPDP ID numbers for at least 3 consecutive months. If
an ID number “ceased to exist” it was assumed that the
store had closed, though it is recognized that there may
be some lag between actual pharmacy closure and the re-
moval of an NCPDP ID number.

Data for December 2005 were missing. Therefore, the
total count of pharmacies for December 2005 was im-
puted from the averages for November 2005 and January
2006. The count of pharmacy closures for December 2005
was imputed as follows: the count of pharmacies whose
last reported date in the NCPDP database was in Novem-
ber 2005 was divided by 2; one-half was put in December
2005 and the other half was put in January 2006. (For
example, if there were 15 pharmacy IDs that showed up
in November 2005 but not in January 2006 and after,
it was assumed that 7.5 pharmacies closed in December
2005 and 7.5 pharmacies closed in January 2006.)

**Statistical Analysis**

Trends in the total count of pharmacies and the count
of pharmacy closures were analyzed by the classic time
series analysis, using ARIMA (Autoregressive Integrated
Moving Average) models developed by Box and Jenk-
ins.\(^9\) SAS 9.2 (SAS Institute Inc., Cary, NC) software was
used for the trend analyses. For each model, data analy-
ysis started with examining the outcome variables to de-
termine their serial structure (noise model). Then, the
variables were transformed if they were not stationary.
If the series was stationary and the white noise test was
rejected, the following procedure was used for model se-
lection. It started from an AR (1) model. If the chi-square
test for the residuals series indicated the residuals were
uncorrelated \(P > .05\), then the AR (1) model was a suf-
icient model. If the chi-square test for the residuals series
indicated the residuals were correlated \(P < .05\), then a
more complex model was tried (AR (1,1): mixed autore-
gressive moving average model, then ARIMA (1, 1, 1):
autoregressive and moving average “mixed” model with
a constant (intercept)). Having identified the ARIMA
model, the analysis proceeded to test if Medicare Part
D (intervention) affects the closure of pharmacies (out-
come). A significant change in the trend of pharmacy
counts and closures ($P < .05$) following the introduction of Medicare Part D would indicate a relationship.

While Medicare Part D started in January 2006, it was expected that there would be a lag in the effect of the program on pharmacy operations. This expectation was based on the assumption that there would be some delay in the impact of the revenue shift and that removal of an NCPDP number from the file would take place at some point after the physical store closure. For these reasons, an a priori assumption was made that the lag would equal 1 year. Therefore, January 2007 was used as the event date and trends were compared before and after that observation.

Overall, 11 models were considered. Models for 4 of the dependent variables (total retail pharmacy count, chain pharmacy count, urban pharmacy count, and closure of chain pharmacies) were not tested using ARIMA models because they either failed to reject the white noise assumption or were not stationary of the residual.

### Results

Table 1 presents the results for the 7 ARIMA models tested.

### Pharmacy Counts

The total number of retail pharmacies grew steadily from 2004 through June 2007, when it peaked at 59,847. Figure 1 shows that the number of retail pharmacies decreased through the remainder of 2007 and into early 2008 before rebounding in the second half of 2008. While there was an overall decline after January 2007, the model failed to reject the white noise assumption, which indicated that there was no autocorrelation pattern in this time series.

The trends for chain and independently owned pharmacies (Figure 2A and B) reveal a difference in monthly counts for the different ownership types. Chain pharmacies grew at a fairly consistent rate from 2004 to 2009, without a statistically significant change in the trend after January 2007. But the number of independent pharmacies, which was steady or growing prior to January 2007, showed a statistically significant decrease after January 2007, with the count of independent pharmacies decreasing by an average of 67.47 stores per month ($P = .004$).

The trends for urban and rural retail pharmacies (Figure 2C and D) have differed since January 2007. The number of urban pharmacies grew consistently prior to January 2007, and while that growth stagnated in 2007, the growth restarted in 2008 and did not show a statistically significant change in the trend between the pre and post periods. Rural pharmacies, however, experienced...
Figure 2 Monthly Count of Different Types of Retail Pharmacies, 2004-2009.
a statistically significant reversal in trend after January 2007. In the preceding period, the number of pharmacies grew from approximately 13,600 to over 14,100. From January 2007 to June 2008, the number of rural pharmacies dropped to fewer than 13,800. On average, the number of rural retail pharmacies decreased by 20.21 stores per month after January 2007 ($P = .004$).

**Pharmacy Closures**

While the total number of pharmacies reflects both store openings and closings, trends in pharmacy closures for the same period were also examined. Figures 3 and 4 show the number of monthly pharmacy closings before and after January 2007. Overall and for independently owned pharmacies (Figures 3 and 4A), the number of pharmacy closings increased at a statistically significant level after January 2007. On average, an additional 114.55 retail pharmacies closed per month after January 2007. Among those closures, 77.16 were independent pharmacies ($P < .001$ for both retail and independent pharmacies). The increase in the number of closings was observed among both urban and rural retail pharmacies (Figure 4B and C). More specifically, there were an additional 84.95 retail pharmacies closed in urban areas and 29.34 retail pharmacies closed in rural areas per month after January 2007.

Of communities with a single community pharmacy at the beginning of the study period, the number that saw their only pharmacy close after January 2007 increased as compared with previous time points (Figure 4D). Before January 2007 the number of pharmacy closures averaged about 3.4 per month; that number increased to almost 8.4 per month after January 2007 ($P < .001$).

**Discussion**

Medicare Part D was intended to improve access to prescription medications for the millions of Medicare beneficiaries that did not have another form of prescription drug insurance. By many accounts, the program has been successful at providing coverage to previously uninsured patients at costs below most initial estimates. One measure of this success is the increase in the number of prescriptions filled after the introduction of the program. While this increase represents the positive effects of the program and would seem to represent an opportunity for community pharmacies to thrive, the results of this study suggest that there may have been an unintended effect on access to pharmacy services.

The overall number of retail pharmacies in the United States has been growing steadily for the past decade, though the growth has been focused on suburban areas and driven by chain, supermarket, and mass merchant pharmacy growth. Independently owned pharmacies have been declining for over 20 years, though the number had stabilized by 2006. Independently owned pharmacies are now more common in rural and urban core areas, which may hold limited appeal to larger operators, than they are in fast growing suburban areas and urban noncore areas. This study suggests that independently owned pharmacies were negatively affected by the implementation of Part D. While this study does not provide information on the cause of a pharmacy’s closure, it...
Figure 4: Monthly Count of the Closures of Different Types of Retail Pharmacies, 2004-2009.

a. All Independent Pharmacies
b. Urban Retail Pharmacies
c. Rural Retail Pharmacies

d. Rural Retail-Sole Community Pharmacies

Mean number of monthly pharmacy closures before January 2007
Mean number of monthly pharmacy closures after January 2007
does strongly suggest that something happened in 2006 or 2007 that changed the trends in pharmacy counts and closures. The change occurred dramatically during this time, departing from any previous trend.

The most obvious change during that time period is the shift of a large number of patients from Medicaid or no coverage for prescription drugs to Medicare Part D plans administered by PBMs. Part D plans competed for customers on a number of factors, including pharmacy network, coverage through the doughnut hole, and formulary. The overwhelming focus of plan selection, however, was on expected total cost to the patient. The Medicare Part D Plan Finder allowed individuals to compare their total expected costs including premiums, deductibles, and cost sharing given their current medications. As a result, many beneficiaries chose plans based primarily on cost. Plans can and did lower the cost to beneficiaries by negotiating lower costs from manufacturers and lower reimbursements to pharmacies. While community pharmacies were free to reject unfavorable contracts, few did so. As a result, many of the PBMs that were the most successful at enrolling members were also the most demanding of pharmacies in their contracting.

While the reimbursement rates for formerly cash-paying customers were expected to decrease as a result of Medicare Part D, that lost revenue was expected to be offset by the increased utilization of previously uninsured patients. To date, there is no research examining the net effect of these changes. The effect on pharmacy reimbursement of shifting dual-eligibles from Medicaid to Medicare Part D has been reported. A February 2009 report from the Office of the Inspector General (OIG) confirmed that average Medicare Part D reimbursements were below Medicaid reimbursements. Specifically, the OIG report found that at the median, the Medicaid reimbursement amount was 17% greater than the Part D amount for the 39 multiple-source drugs examined. In addition, Medicaid dispensing fees were at least 40% and 55% greater for single-source and multisource drugs, respectively. Moreover, Winegar et al found that pharmacy gross margin per claim decreased by 23.6% for patients who shifted from Medicaid to Medicare Part D. Since the shift from Medicaid to a Medicare Part D plan was unlikely to affect utilization, these differences in reimbursement indicate a net reduction in pharmacy revenue.

How this increased rate of pharmacy closures will affect patient access to pharmacy services is beyond the scope of this study, but combined with the results of earlier studies, there is reason to believe that access will be adversely affected. Xiao et al showed that patients, whose pharmacy closed, reduced their medication utilization. This effect was even greater in rural communities. Though the Xiao study did not look specifically at pharmacies that were the sole provider in a community, the effect in those communities would be at the high end of the distribution of patient reduction in medication use. In communities with a single pharmacy, additional services provided by the community pharmacy are at risk if the pharmacy closes. From their interviews with sole community pharmacies, Radford et al found that a majority of the pharmacies were providing services to the local hospital, nursing home, community health center, and/or other providers.

Further research is needed to confirm that the implementation of Medicare Part D was the direct cause of pharmacy closures. Ideally, a study with an unexposed control group would be used to compare the differences in counts and closure rates, but the all-inclusive nature of the Medicare Part D program makes the identification of such a group difficult. The results of this study suggest that Medicare Part D had an unintended effect on patient access to community pharmacy services. In particular, it was related to a decrease in the number of independently owned and rural pharmacies and an increased rate of closures of pharmacies that were the sole provider in their community. Policy makers should consider how to best maintain beneficiary access in this program. Changes in reimbursement to at-risk pharmacies (sole community pharmacies a minimum distance from other sources) similar to the cost-based reimbursement system used for Critical Access Hospitals may be one policy option. Other options should also be explored, including tax incentives that encourage pharmacies to locate in underserved communities. With Medicare Part D being administered by private plans, and proposals for reform also using private plans, there is very little impact of government payment on pharmacies, other than in communities where Medicaid is the major payer. Policy leverage will exist through regulations of private plans. This could be done through requirements regarding access to services. Under these requirements, improved private payment could be used as a means to maintain access.

Medicare Part D enrollment continues to grow and is the primary payer for approximately 20% of all prescriptions filled. The fact that Medicare Part D spending has come in below projected costs has been attributed to the greater than anticipated competition between private plans. Even so, the current reform has included changes to Medicare Part D, focused on reducing patient and government expenditures through the reduction of the coverage gap or “doughnut hole.”

The current study has found a decrease in the number and an increase in the closing of independent and rural pharmacies after the implementation of Medicare Part D. This unintended consequence of Medicare Part D may reduce beneficiary access to pharmacy services in direct
opposition to the stated goals of the program. Policy makers should consider ways to ensure that patient access to a community pharmacy is maintained.

References


